LAWRENCE LIVERMORE
REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory, July 19-23, 2010

DISCOVERing fusion

Inside the National Ignition Facility target chamber.

The National Ignition Facility is featured in a four-part special series titled "Powering the Future" on the Discovery Channel. NIF is highlighted in part one, "The Energy Revolution."

"As the crisis in the Gulf of Mexico deepens, the ongoing search for viable alternative energy sources is more urgent than ever before," says series host M. Sanjayan, lead scientist at The Nature Conservancy in Virginia. But navigating the options can be complicated. Powering the Future examines where energy could come from and the effort to create a clean, limitless, secure supply of energy.

NIF, the world's largest and most energetic laser, will be used to achieve fusion ignition for the first time in a laboratory setting. Fusion is the same force that powers the sun and the stars and holds promise as an unlimited source of clean energy.

To see the video, go here:
https://publicaffairs.llnl.gov/news/lab_report/2010/DiscoveryNIF.mov

SPIEng on satellites

The visualization shows the simulated debris from an exploded satellite in the lower earth orbit along with active satellites.

The United States and nearly every other country in the world depend on space-based systems to navigate, communicate, monitor environmental changes and provide surveillance data.

And the Laboratory is working on technology to ensure that space-based systems, like satellites, are less likely to malfunction or even collide. The new system, which was developed with Los Alamos National Laboratory and the Air Force Research Laboratory, also helps detect and monitor space debris and other threats to space operations.

Since 2008, a team of computational physics and engineering experts at LLNL has been designing a comprehensive set of analysis, modeling, simulation and visualization tools called the Testbed Environment for Space Situational Awareness (TESSA).

TESSA improves performance analysis of the collection of radio-frequency and optical-sensing systems called the Space Surveillance Network (SSN) currently used by the U.S. Air Force Space Command to monitor space activities.

To read more, go to http://spie.org/x40998.xml?highlight=x2406&ArticleID=x40998

And the winner is . . .

Dmitri Ryutov

LLNL physicist Dmitri Ryutov has received the Fusion Power Associates 2010 Distinguished Career Award for his contributions to fusion research.

"I was surprised," Ryutov said with characteristic humility, noting this places him in the distinguished company of such fusion pioneers as Lyman Spitzer, widely regarded as the "godfather of fusion," and the Lab's Dick Post as well as other luminaries of fusion science.

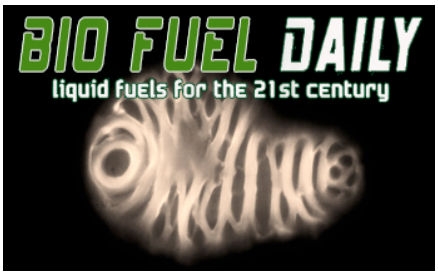
While he has received recognition and awards for individual projects and research achievements, Ryutov said he was especially honored to receive an award for the body of his contributions to physics, even if it makes him feel his age.

"When you receive a career award people think you've done all you can do and that it is time to retire," he said with a glint in his eye. "But I would like to think the best is yet to come."

After 16 years at the Laboratory working on a broad range of projects, Ryutov shows no signs of slowing down.

To read more, go to https://newsline.llnl.gov/_rev02/articles/2010/jul/07.23.10-ryutov.php

Down to the nanometer scale



A xylem cell with fluorescent lignocelluloses bands.

By imaging the cell walls of a zinnia leaf down to the nanometer scale, Lab energy researchers have a better idea on how to turn plants into biofuels.

In a paper appearing online in the journal *Plant Physiology,* a team including Lawrence Livermore scientists used four different imaging techniques to systematically drill down deep into the cells of *Zinnia elegans*.

Zinnia is a common garden annual plant with solitary daisy like flower heads on long stems and sandpapery, lace-shaped leaves. The leaves of seedlings provide a rich source of single cells that are dark green with chloroplasts and can be cultured in liquid for several days at a time. During the culturing process, the cells change in shape to resemble the tube-like cells that carry water from roots to leaves. Known as xylem, these cells hold the bulk of cellulose and lignin in plants, which are both major targets of recent biofuel research.

"The basic idea is that cellulose is a polymer of sugars, which if released by enzymes, can be converted into alcohols and other chemicals used in alternative fuel production," said LLNL eam leader Michael Thelen.

To read more, go to
http://www.biofueldaily.com/reports/Drilling_Down_To_The_Nanometer_Depths_Of_Leaves_For_Biofuels_999.html

If you have a dream

As a student, you need information about the environment, physics, chemistry or the earth and don't know where to go. And your teacher says that the information you reference must be authoritative. Plus, you need the information fast.

Look no further than the Lawrence Livermore Lab, which will be participating in the inaugural USA Science & Engineering Festival (also dubbed the Dream Festival), the country's first national science festival.

The Department of Energy (DOE) is a Dream Festival partner and will sponsor 11 highly informative, interactive exhibits in the festival's Expo on Oct. 23-24 at the National Mall in Washington, DC.

LLNL scientists will participate in sessions exploring how physicists are harnessing energy from the sun to make clean and renewable energy.

In addition to DOE, its national laboratories represented at the expo include: Ames, Argonne, Brookhaven, Fermi, Jefferson Lab, Lawrence Berkeley, Lawrence Livermore, National Energy Technology, National Renewable Energy, Princeton Plasma Physics, Sandia, and Oak Ridge.

To read more, go to
http://scienceblogs.com/usasciencefestival/2010/07/a_dream_festival_partner_us_de.php

Latest Newsline available

NEWSLINE

Newsline provides the latest Lab research and operations news. See the most recent issue at

https://newsline.llnl.gov

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail mailto:labreport@llnl.gov.

The *Livermore Lab Report* archive is available at:
https://publicaffairs.llnl.gov/news/lab_report/2010index.html